

What is claimed is:

1. A method for generating stereoscopic images,
5 comprising the steps of:

converting, of objects made of polygons having 3D
coordinates, object data to be displayed in a planar view
to reference camera coordinate system data with its origin
at a reference camera and converting object data to be
10 displayed in a stereoscopic view to parallax camera
coordinate system data for right and left eyes
respectively with their origins at parallax cameras for
right and left eyes having predetermined parallax angles;

drawing the reference camera coordinate system
15 object data and the parallax camera coordinate system
object data for right eye as image data for right eye in
a video memory;

drawing the reference camera coordinate system
object data and the parallax camera coordinate system
20 object data for left eye as image data for left eye in the
video memory; and

synthesizing the image data for right and left eyes
drawn in the video memory and displaying, on a stereoscopic
display device, images mixing stereoscopic and planar
25 objects.

2. The method for generating stereoscopic images

according to claim 1, wherein the objects to be displayed in a planar view are objects having their image formation positions outside a stereoscopic viewable range of the stereoscopic display device in a 3D coordinate space.

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3. A method for generating stereoscopic images, comprising the steps of:

converting object data made of polygons having 3D coordinates to parallax camera coordinate system data respectively with their origins at parallax cameras for
10 right and left eyes having predetermined parallax angles;

performing scaling using the converted parallax camera coordinate system data to compress coordinates of the parallax camera coordinate system data in the
15 direction of the depth of a stereoscopic viewable range of a stereoscopic display device such that all the objects have their image formation positions within the stereoscopic viewable range;

drawing the scaled parallax camera coordinate system data in a video memory; and
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displaying, on the stereoscopic display device, drawing data drawn in the video memory.

4. A method for generating stereoscopic images, comprising the steps of:
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converting object data made of polygons having 3D coordinates to parallax camera coordinate system data

respectively with their origins at parallax cameras for right and left eyes having parallax angles;

 narrowing the parallax angles during conversion to the parallax camera coordinate system data such that all
5 objects of the parallax camera coordinate system data to be converted have their image formation positions within a stereoscopic viewable range of a stereoscopic display device; and

 displaying, on the stereoscopic display device, the
10 converted parallax camera coordinate system data at the narrowed parallax angles.

5. A method for generating stereoscopic images, comprising the steps of:

15 converting object data made of polygons having 3D coordinates to reference camera coordinate system data with its origin at a reference camera;

 converting, of object data converted to the reference camera coordinate system data, object data to be displayed
20 in a stereoscopic view to parallax camera coordinate system object data respectively with their origins at parallax cameras for right and left eyes having predetermined parallax angles;

 drawing the reference camera coordinate system
25 object data and the parallax camera coordinate system object data for right eye as image data for right eye in a video memory;

drawing the reference camera coordinate system
object data and the parallax camera coordinate system
object data for left eye as image data for left eye in the
video memory; and

5 synthesizing the image data for right and left eyes
drawn in the video memory and displaying, on a stereoscopic
display device, images mixing stereoscopic and planar
objects.

10 6. The method for generating stereoscopic images
according to claim 5, wherein the objects to be displayed
in a planar view are objects having their image formation
positions outside a stereoscopic viewable range of the
stereoscopic display device in a 3D coordinate space.

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7. A method for generating stereoscopic images,
comprising the steps of:

converting object data made of polygons having 3D
coordinates to reference camera coordinate system data
20 with its origin at a reference camera;

generating, from the reference camera coordinate
system data, parallax camera coordinate system data
respectively with their origins at parallax cameras for
right and left eyes having parallax angles;

25 performing compression scaling during generation of
the parallax camera coordinate system data such that all
objects have their image formation positions within a

stereoscopic viewable range of a stereoscopic display device;

drawing the parallax camera coordinate system data for right and left eyes in a video memory; and

5 synthesizing the image data for right and left eyes drawn in the video memory and displaying the data on the stereoscopic display device.

8. A method for generating stereoscopic images,
10 comprising the steps of:

converting object data made of polygons having 3D coordinates to reference camera coordinate system data with its origin at a reference camera;

15 converting the reference camera coordinate system data to parallax camera coordinate system data respectively with their origins at parallax cameras for right and left eyes having parallax angles;

narrowing the parallax angles during conversion to the parallax camera coordinate system data such that all
20 objects of the parallax camera coordinate system data to be converted have their image formation positions within a stereoscopic viewable range of a stereoscopic display device; and

displaying, on the stereoscopic display device, the
25 converted parallax camera coordinate system data at the narrowed parallax angles.

9. The method for generating stereoscopic images according to any one of claim 1, wherein the parallax angles of the parallax cameras are adjustable in real time by operations of an observer.

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10. The method for generating stereoscopic images according to claim 9, wherein the parallax angles are continuously and gradually varied as a result of the adjustment by operations of the observer.

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11. An apparatus for generating stereoscopic images, comprising:

a geometry unit for converting object data made of polygons having 3D coordinates to reference camera coordinate system data with its origin at a reference camera and converting, of objects converted to the reference camera coordinate system data, object data to be displayed in a stereoscopic view to parallax camera coordinate system data respectively with their origins at parallax cameras for right and left eyes having predetermined parallax angles;

a video memory for drawing the reference camera coordinate system object data and the parallax camera coordinate system object data for right eye as image data for right eye and further drawing the reference camera coordinate system object data and the parallax camera coordinate system object data for left eye as image data

for left eye; and

a rendering unit for synthesizing the image data for right and left eyes drawn in the video memory, wherein a stereoscopic display device is provided that displays
5 images mixing stereoscopic and planar objects using image data for right and left eyes synthesized by the rendering unit.

12. An apparatus for generating stereoscopic images,
10 comprising:

a geometry unit for converting object data made of polygons having 3D coordinates to reference camera coordinate system data with its origin at a reference camera and generating, from the reference camera
15 coordinate system data, parallax camera coordinate system data respectively with their origins at parallax cameras for right and left eyes having parallax angles; and

a stereoscopic display device for displaying an image made by synthesizing images for right and left eyes
20 generated from the parallax camera coordinate system data for right and left eyes, wherein

the parallax camera coordinate system data is scaled during generation of the parallax camera coordinate system data from the reference camera coordinate system data by
25 the geometry unit such that all objects have their image formation positions within a stereoscopic viewable range of the stereoscopic display device.

13. An apparatus for generating stereoscopic images,
comprising:

a geometry unit for converting object data made of
5 polygons having 3D coordinates to reference camera
coordinate system data with its origin at a reference
camera and generating, from the reference camera
coordinate system data, parallax camera coordinate system
data respectively with their origins at parallax cameras
10 for right and left eyes having parallax angles; and

a stereoscopic display device for displaying an image
made by synthesizing images for right and left eyes
generated from the parallax camera coordinate system data
for right and left eyes, wherein

15 the parallax angles are set during generation of the
parallax camera coordinate system data from the reference
camera coordinate system data by the geometry unit such
that all objects have their image formation positions
within a stereoscopic viewable range of the stereoscopic
20 display device.

14. The apparatus for generating stereoscopic images
according to any one of claim 11, wherein an input unit
is further provided, and wherein the camera parallax
25 angles are adjusted in real time by the geometry unit
according to a parallax adjustment signal input from the
input unit in correspondence with operations of the

observer.

15. The apparatus for generating stereoscopic images according to claim 14, wherein the parallax angles are
5 continuously and gradually varied as a result of the parallax angle adjustment.

16. A storage medium for storing a program run in an apparatus for generating stereoscopic images, the
10 apparatus being provided with a geometry unit for converting coordinates of object data made of polygons having 3D coordinates and with a stereoscopic display device for displaying model data that has been subjected to the coordinate conversion, the program including the
15 steps of:

allowing the geometry unit to convert, of the objects, object data to be displayed in a planar view to reference camera coordinate system data with its origin at a reference camera and convert object data to be displayed
20 in a stereoscopic view to parallax camera coordinate system data respectively with their origins at parallax cameras for right and left eyes having predetermined parallax angles;

drawing the reference camera coordinate system
25 object data and the parallax camera coordinate system object data for right eye as image data for right eye in a video memory;

drawing the reference camera coordinate system
object data and the parallax camera coordinate system
object data for left eye as image data for left eye in the
video memory; and

5 synthesizing the image data for right and left eyes
drawn in the video memory and displaying, on a stereoscopic
display device, images mixing stereoscopic and planar
objects.

10 17. The storage medium for storing a program according
to claim 16, wherein the objects to be displayed in a planar
view are objects having their image formation positions
outside a stereoscopic viewable range of the stereoscopic
display device in a 3D coordinate space.

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18. A storage medium for storing a program run in an
apparatus for generating stereoscopic images, the
apparatus being provided with a geometry unit for
converting coordinates of object data made of polygons
20 having 3D coordinates and with a stereoscopic display
device for displaying model data that has been subjected
to the coordinate conversion, the program including the
steps of:

allowing the geometry unit to convert the object data
25 to parallax camera coordinate system data respectively
with their origins at parallax cameras for right and left
eyes having predetermined parallax angles;

performing compression scaling of the converted
parallax camera coordinate system data in the direction
of the depth of a stereoscopic viewable range of the
stereoscopic display device such that all the objects have
5 their image formation positions within the stereoscopic
viewable range;

drawing the objects that have been subjected to
compression scaling as image data for right and left eyes
in a video memory; and

10 synthesizing the image data drawn in the video memory
and displaying the data in a mixture on the stereoscopic
display device.

19. A storage medium for storing a program run in an
15 apparatus for generating stereoscopic images, the
apparatus being provided with a geometry unit for
converting coordinates of object data made of polygons
having 3D coordinates and with a stereoscopic display
device for displaying model data that has been subjected
20 to the coordinate conversion, the program including the
steps of:

allowing the geometry unit to convert the object data
to parallax camera coordinate system data respectively
with their origins at parallax cameras for right and left
25 eyes having parallax angles;

narrowing the parallax angles such that all objects
of the parallax camera coordinate system data to be

converted have their image formation positions within a stereoscopic viewable range of the stereoscopic display device; and

displaying, on the stereoscopic display device, the
5 converted parallax camera coordinate system data at the narrowed parallax angles.

20. The storage medium for storing a program according to any one of claim 16, wherein the parallax angles of the
10 parallax cameras are adjustable in real time by operations of an observer.

21. The storage medium for storing a program according to claim 20, wherein the parallax angles are continuously
15 and gradually varied as a result of the adjustment by operations of the observer.